Summer 2015

Turning Up the Heat on Malignant Hyperthermia

Katie Carroll

Otterbein University, katie.carroll@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn

Part of the Anesthesiology Commons, Medical Pathology Commons, and the Nursing Commons

Recommended Citation


This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Master of Science in Nursing (MSN) Student Scholarship by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact shickey@otterbein.edu.
POTENTIALLY LIFE-THREATENING DISORDER

Malignant Hyperthermia (MH) is a rare and potentially lethal reaction that occurs in susceptible patients undergoing general anesthesia. It is a hereditary disorder characterized by an autosomal dominant disorder, where susceptible patients have an increased sensitivity to certain anesthetic agents. MH events are typically associated with exposure to depolarizing muscle relaxants, such as succinylcholine, and can be triggered by the administration of volatile agents like halothane or sevoflurane. Once triggered, MH can progress rapidly, leading to a cascade of potentially lethal complications that can lead to severe hyperthermia, rhabdomyolysis, coagulopathy, and death. Therefore, early detection and prompt treatment are crucial in minimizing the risk and reducing mortality. MH is considered a medical emergency, and healthcare providers must be prepared to manage these cases effectively to prevent potentially fatal outcomes.

**Pathophysiological Processes**

Malignant Hyperthermia results from a hypermetabolic state that is marked by uncontrolled release of energy from the body leading to metabolic and physiological changes. Key factors include:

- **Calcium Dysregulation**: Calcium stimulates actin and myosin to contract, and when calcium concentration increases, muscle contraction becomes uncontrolled.
- **ATP Depletion**: ATP depletion occurs due to the increased energy consumption required to maintain the hypermetabolic state.
- **Electrolyte Imbalances**: Changes in calcium, potassium, magnesium, sodium, and phosphate levels occur, which can lead to cardiac dysrhythmias and kidney failure.

**Signs and Symptoms**

While MH can occur at any time during anesthesia, it is most commonly seen within the first two hours post-induction, with a peak incidence between 45 minutes and 90 minutes. Common signs and symptoms of MH include:

- **Tachycardia**
- **Hypertension**
- **Tachypnea**
- **Increased body temperature**
- **Respiratory alkalosis**
- **Increased oxygen consumption**

**Case Study**

A 22-year-old male presented to a military hospital after being injured by an improvised explosive device. He presented with a penetrating injury to his left thigh; radiological findings confirmed a left femur fracture. The patient was conscious and able to answer questions, denied any allergies or past medical history. The man was prepared for surgery and given ketamine, 50 mg; atropine, 100 mg; and succinylcholine, 120 mg for rapid sequence intubation. The patient developed a systolic blood pressure (BP) 115/60 mmHg; heart rate (HR) 90/min; temperature 99.6 F; oxygen saturation (SpO2) 98%; and end tidal carbon dioxide (ETCO2) 14. The patient was diagnosed with malignant hyperthermia. The patient’s temperature climbed to 100.9 F in 20 minutes, a diagnosis of MH was made. The patient denied any drug allergies. Two minutes following ETO2 was 53 and temperature was 100.5 F, all other vital signs were stable. Seventy minutes after diagnosis, the patient was completely stable and was transported to another facility. (Dirksen & Perry, 2013)

**Nursing Implications**

The nursing implications of malignant hyperthermia include:

- **Immediate intervention**: Recognition of signs and symptoms is crucial for early intervention.
- **Monitoring vital signs**: Continuous monitoring of vital signs, including temperature, blood pressure, heart rate, and respiratory rate, is essential.
- **Prevention**: Educating patients, families, and healthcare providers about the signs and symptoms of MH is important.
- **Treatment**: Prompt administration of dantrolene, a muscle relaxant, is critical to prevent further muscle contraction.

**Conclusion**

Malignant hyperthermia is a rare and potentially lethal reaction that can be challenging to detect and treat. Due to the low incidence of MH events, medical personnel are often not familiar and/or confident in the management of such an event. Therefore, it is the responsibility of the healthcare team to familiarize themselves with the diagnosis, management, and treatment of MH. Continued education and proper treatment are critical to ensure survival and prevent complications.

**References**


References


